Appln. No. 10/743,855
Amdt. Dated January 3, 2006
Reply to Office Action of October 3, 2005

Amendments to the Claims

1.   (Currently amended) A method for converting a gaseous hydrocarbon to a syngas product, the method comprising:

       providing a hydrocarbon oxidation reactor comprising a reaction zone containing a thin shell catalyst, wherein the thin shell catalyst comprises a discrete nonmicroporous support structure and a catalytically active metal, wherein said thin shell catalyst has an effectiveness factor greater than 0.1 while under catalytic oxidation promoting conditions, and further wherein a thin shell containing said catalytically active metal is disposed on the discrete nonmicroporous support structure;

       contacting a reactant gas comprising a C_1-C_5 hydrocarbon and oxygen over the thin shell catalyst in the reaction zone; and

       maintaining catalytic oxidation promoting conditions in the reaction zone during the contacting such that at least 75% ~~a portion of~~ the reactant gas is converted to a product comprising hydrogen and carbon monoxide.

2.   (Currently amended) The method according to claim 1 wherein said support structure has a characteristic longest dimension less than 25 mm~~, and wherein said thin shell catalyst has an effectiveness factor greater than 0.1 while under catalytic oxidation promoting conditions~~.

3.   (Original) The method according to claim 2 wherein said thin shell catalyst has an effectiveness factor greater than 0.2.

4.   (Original) The method according to claim 2 wherein said thin shell catalyst has an effectiveness factor greater than 0.4.

5.   (Original) The method according to claim 1, wherein the product has a H_2:CO molar ratio between 1.5 and 2.3.

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6.   (Original) The method according to claim 1, wherein the product further comprises C_1 – C_5 olefins.

7.   (Original) The method of claim 1 wherein the nonmicroporous support comprises a material selected from the group consisting of glass, metal oxides, refractory material, metal carbides, metal nitrides, and combinations thereof.

8.   (Original) The method of claim 1 wherein the nonmicroporous support structure comprises a refractory material.

9.   (Original) The method of claim 8 wherein the refractory material is selected from the group consisting of cordierite, cordierite-alpha alumina, silicon nitride, zircon mullite, spodumene, alumina-silica magnesia, zircon silicate, sillimanite, magnesium silicates, zircin, petalite, alpha alumina and aluminosilicates, zirconia, magnesium stabilized zirconia, zirconia stabilized alumina, yttrium stabilized zirconia, calcium stabilized zirconia, titania, silica, magnesia, niobia and vanadia, carbon black, $CaCO_3$, $BaSO_4$, silica-alumina, alumina, and combinations thereof.

10.   (Original) The method of claim 8 wherein the refractory material is selected from the group consisting of carbon, alumina, silica, titania, zirconia, silica-alumina, and combinations thereof.

11.   (Original) The method of claim 1 wherein the discrete nonmicroporous support structure is a particulate.

12.   (Original) The method of claim 1 wherein the discrete nonmicroporous support structure comprises at least one geometry selected from the group consisting of powders, particles, pellets, granules, spheres, beads, pills, balls, noodles, cylinders, irregularly-shaped particles, pastilles, extrudates and trilobes.

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13.   (Original)   The method of claim 1 wherein the thin shell catalyst comprises a plurality of discrete structures, and wherein at least a majority of the discrete structures each have a maximum characteristic length of less than 25 millimeters.

14.   (Original)   The method of claim 13 wherein the majority of the discrete structures have a maximum characteristic length of less than about six millimeters.

15.   (Original)   The method of claim 13 wherein the discrete structures have a maximum characteristic length between about 0.5 mm and about 6 mm.

16.   (Original)   The method of claim 1 wherein the support structure is generally spherical and the ratio of the thickness of the catalyst thin shell to the radius of the support structure is less than 1:1.

17.   (Original)   The method of claim 1 wherein the thickness of the catalyst thin shell is between about 1 to about 1000 microns (μm).

18.   (Original)   The method of claim 1 wherein the thickness of the catalyst thin shell is between about 5 to about 100 microns (μm).

19.   (Original)   The method of claim 1 wherein the contacting step comprises contacting a reactant gas mixture comprising the hydrocarbon and a source of oxygen with the catalyst at a gas hourly space velocity of at least about 20,000 h^{-1}.

20.   (Original)   The method of claim 1 wherein the contacting step comprises contacting a reactant gas mixture comprising the hydrocarbon and a source of oxygen with the catalyst at a gas hourly space velocity between about 100,000 h^{-1} and 6,000,000 h^{-1}.

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21.   (Original) The method of claim 1 wherein the step of maintaining the catalyst at catalytic oxidation promoting conditions during the contacting includes maintaining a gas temperature of about 600-1,800°C.

22.   (Original) The method of claim 1 wherein the step of maintaining catalytic oxidation promoting conditions during the contacting includes maintaining a pressure of about 130-10,000 kPa.

23.   (Original) The method of claim 1 further comprising mixing a methane-containing feedstock and an O_2-containing feedstock to provide a reactant gas having a $C:O_2$ molar ratio of about 1.25:1 to about 3.3:1.

24.   (Original) The method of claim 1 wherein the C_1-C_5 hydrocarbon comprises at least about 50% methane by volume.

25-28. Canceled